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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/705,569	11/03/2000	Kevin L. Glass	DBS-103-1	6671

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Carlos A Tore
Browning Bushman
5718 Westheimer Suite 1800
Houston, TX 77057

EXAMINER	
PALADINI, ALBERT WILLIAM	

ART UNIT	PAPER NUMBER
2125	

DATE MAILED: 08/17/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/705,569	GLASS, KEVIN L.	
	Examiner	Art Unit	
	Albert W Paladini	2125	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 November 2000*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-33* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *17-33* is/are allowed.

6)☒ Claim(s) *1-16* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 2-11-01
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

2. Claims 1-16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1

The methodology recited does not appear to achieve the objective of "optimizing a drill bit assembly design" recited in line 1 of the preamble. Step 4 on line 11 recites, "modifying a depth of cut parameter of said first drill bit assembly to provide a subsequent bill assembly design."

Then, based on a comparison of the "first rate of penetration" (line 7) and the "second rate of penetration" (line 14), a "selected drill bit assembly" (line 19) is chosen as the optimum.

Thus, the process consists of taking a first penetration measurement, arbitrarily modifying the depth of cut parameter, taking a second penetration measurement, and selecting the best of the two measurements. This process results only in selecting the better of the two measurements taken. Since no methodology is involved in making the modification, the probability of one of the two measurements resulting in achieving a local or global minimum or maximum is very unlikely.

The method of taking two measurements with different parameter settings does not result in an optimum solution, but results in the solution which is the most desirable of the two.

The two measurements taken may not result in the "desired rate of penetration" which appears to be the objective of the optimization process.

Appropriate correction and clarification is required.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Edlund (5,465,798).

Edlund discloses a drill automation control system. He states on lines 30-35 in column 10 "The system is set to automatically archive data on each of hole depth, specific energy, penetration rate, bit load, torque, borehole pattern, borehole ID bit ID used for drilling and time. Alarms which can be audibly and/or visually provided to the user include cooling alarms, overheating alarms, pressure alarms and so forth." Then, referring to figure 4, Edlund demonstrates the optimization process, on lines 46-59 in column 10 where he states, "In block 206, a system setup is performed in response to operator selections. These setup parameters include rotation speed of the drill bit, the torque set point, vibration limit, collar depth, hole depth, bit and borehole identifications, pull-down limits, air pressure limits and so forth. These various setup functions must be completed before a drilling operation can be initiated. The requirement that all necessary parameters be established by the operator prior to a drilling operation is reflected by the decision blocks 208, 210, 212, 214, 216, 218, 220, 222, 224 and 226. One or more of these parameters may be skipped. Verification blocks 228, 230, 232, 234, 236, 238, 240, 242, 244 and 246 are also illustrated for each of these set-up functions." Edlund does not explicitly describe a process, which calculates a first and second rate

of penetration as recited in the claims. However, as discussed in paragraphs 1-3, the process recited in the instant application does not lead to an optimum solution.

In figure 4, it would be obvious to one of ordinary skill in the art that more than one measurement is made by referring to the numerous feedback loops. For example, the feedback loop from decision block 272 back to block 266 demonstrates that the algorithm continues until optimum depth conditions are achieved.

Allowable Subject Matter

5. Claims 18-33 are allowed.

6. The following is a statement of reasons for the indication of allowable subject matter: None of the references cited or the art searched disclose or teach alone or in combination utilizing the first and second set of torque characteristics based on the first and second depth of cut characteristics to obtain the depth of cut versus torque relations or representations, and from these representations, selecting a drill bit assembly combined with in the same manner as recite with the other steps of independent claims 17, 23, and 28.

Relevant Prior Art

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Sheppard (4760735) discloses a method and apparatus for analyzing a drilling process where the conditions under which an earth boring apparatus such as a conventional drill bit operates are analyzed by measuring the torque applied at the surface to the drill string and the effective torque acting on the drill bit. The applied torque and effective torque are compared to determine torque loss. Likewise, applied weight on the drill string and effective

weight acting on the drill bit may be measured and compared to determine drag losses. These measurements and comparisons may be done in real-time to diagnose unfavorable drilling conditions, or to assist the driller in decisions such as whether to trip out to change a bottom hole assembly, or to attempt a hole cleaning process such as a wiper trip, or to perform other procedures. The torque or weight measurements may be used to calculate variable coefficient of friction acting on the drilling string. Trends in the torque or weight losses, or in the value of the coefficient of friction, may be observed on a plot of these quantities as a function of depth.

Millheim (4794534) discloses a method drilling a well utilizing simulation in conjunction with measurement data by generating a measurement while drilling record, which is generated on a real time or on a per-connection basis. Such MWD data includes sequence number, side track number, depth of bit, depth of gamma ray sensor, depth of directional sensor, inclination, direction, downhole weight on bit, downhole torque, gamma ray, resistivity, downhole fluid temperature, downhole annulus pressure, downhole interval pressure, downhole pressure drop, downhole mud weight, alternator voltage, and the like.

Jogi (5415030) discloses a method for evaluating formations and bit conditions in a drilling operation utilizing a measurement while drilling process for identifying and evaluating rock formations and monitoring the trajectory of the borehole in real time. An MWD tool is generally located in the lower portion of the drill string near the bit. The tool is either housed in a section of drill collar or formed so as to be compatible with the drill collar. It is desirable to provide information of the formation as close to the drill bit as is feasible. Several methods for evaluating the formation using the drill bit have been employed. These methods eliminate the time lag between the time the bit penetrates the formation and the time the MWD

tool senses that area of the formation. The measurements available are rate of penetration (ROP) and bit revolutions per minute (RPM) which are determined at the surface and, downhole weight on bit (WOB) and downhole torque on the bit (TOR) which are derived from real time insitu measurements made by an MWD tool.

Goldman (6408953) disclose a method for predicting performance of a drilling system for a given formation where the predicted drilling mechanics include at least one of the following drilling mechanics selected from the group consisting of bit wear, mechanical efficiency, power, and operating parameters. In one embodiment, the operating parameters can include weight-on-bit, rotary rpm (revolutions-per-minute), cost, rate of penetration, and torque. The rate of penetration further includes an instantaneous rate of penetration (ROP) and an average rate of penetration (ROP-AVG).

8. Any inquiry concerning this communication or earlier communication from the examiner should be direct to Albert W. Paladini whose telephone number is (703) 308-2005. The examiner can normally be reached from 7:30 to 3:30 PM on Monday, Tuesday, Thursday, and Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Leo P. Picard, can be reached on (703) 308-0538. The official fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

August 12, 2004

Albert W. Paladini
Primary Examiner
Art Unit 2125